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PCT/GB 00/00109

The Patent Office

09/889478

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The Patent Office
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#7
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I also certify that the attached copy of the request for grant of a Patent (Form 1/77) bears an amendment, effected by this office, following a request by the applicant and agreed to by the Comptroller-General.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

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Signed

Dated 1 February 2000

Patents Form 1/77

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16)

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18JAN99 E418327-1 C48339
P01/7700 0.00 - 9900891.4

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
Newport
Gwent NP9 1RH

1. Your reference BJ/JBM/001

2. Patent application number *(The Patent Office will fill in this part)* **9900891.4** 16 JAN 1999

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

JOHN MONTEITH
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Patents ADP number *(if you know it)* 7585425001

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TW16 6BS

Patents ADP number *(if you know it)* 7585441001

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention ELECTRONIC APPARATUS

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

~~2 ASHLEY WAY~~
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ST ALBANS
HERTS.
AL1 3AW.

Patents ADP number *(if you know it)*

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*
	—	

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*
—	

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

NO

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	
Description	10
Claim(s)	2
Abstract	1
Drawing(s)	4 + 4

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	1 (ONE)
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. We request the grant of a patent on the basis of this application.

Signature J Alan Monteith Date 14/1/99

B. James 14/1/99

12. Name and daytime telephone number of person to contact in the United Kingdom JOHN MONTEITH 01483 833279

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After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

a) *If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.*

b) *Write your answers in capital letters using black ink or you may type them.*

c) *If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.*

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e) *Once you have filled in the form you must remember to sign and date it.*

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PATENTS ACT 1977
BJ/JBM/001

Title: Electronic Apparatus

Description of Invention

The invention relates to an electronic apparatus and in particular to one adapted to function as a method of collecting, retaining and making available this electronic data in such a fashion that it can be accessed efficiently from, for example; smart cards and information cards.

This format is a cost-effective solution for efficient storage and retrieval of data on a conveniently sized, portable medium.

The invention is intended to augment the 'Smart' interface as in ISO 7816. It is intended to enable the use of the interface for parallel data transfers between a Credit Card sized (86mm x 54mm) standard card and a host reader. This new standard will facilitate data transfer through the interface by at least eight times the speed of the existing serial interface, for the same clock speed at the interface.

These sampling rates at one byte instead of the conventional one bit per clock serial data transfers enables the application of the Smart Card to carry out more complex assignments and broadens the generic use of the card as an information source.

In conventional electronic interfaces where data is required to be held on solid state logic devices, whether read only, programmable, or erasable / rewriteable memory, either serial or parallel interconnections between the data fields and the logic integrated circuits may be used.

In the international standard and conventions agreed for Smart Card protocols, in particular ISO7816 parts 1-6, the data stream and information content is connected to the source integrated circuit on the smart card via a serial data interface as defined in the ISO7816 standard.

This arrangement is entirely satisfactory for the limited amount of data transfer necessary to carry out the security code functions and limited data transfers in conventional Smart Card applications.

Other applications not previously envisaged are those that require significantly more data to be stored and accessed. These require the incorporation of integrated circuits comprising many times the 256 bytes to 8k bytes (typical) of data storage capacity normally available in a Smart Card.

To reduce data transfer times between the Smart Card and host reader for these purposes, the transfer rate needs to be faster than the standard serial interface permits. The use of a parallel interface enables a faster data transfer rate to be accomplished using the existing serial clock rate.

Additionally, this parallel interface need not be governed by the ISO 7816 protocol clock speeds, thereby removing these speed constraints from the interface for non-ISO applications.

It is obvious that by removing these speed constraints, the faster data transfer rate achieved with a parallel interface is an improvement over the conventional Smart Card operating parameters.

Features of the Electrical Apparatus.

The Electrical Apparatus maintains the external dimensions of the Smart Card and utilises the contact pad protocols of the ISO 7816 standard to position the serial port interface, hereafter referred to as the First Part, while also including an adjacent interconnected contact pad with surfaces to include the transmission of parallel information, hereafter called the Second Part.

This information may be controlled by the logic circuits and programme disciplines of the ISO 7816 interconnection whilst enabling the rate of data transfer to be significantly increased.

The new interface, the Third Part, consists of an ISO 7816 eight pin interface, the First Part, combined with a further eight pin interface, the Second Part. The combined interface consists of sixteen pins in total, with the Second Part adjacent to the existing First Part and occupies an area of double the width of the normal ISO 7816 interface.

The existing ground connection at pin 5 of the First Part is extended across via the centre of the First Part to the centre of the Second Part. Detection of a ground connection at the centre of the Second Part will distinguish the new interface, the Third Part, from a normal ISO 7816 interface. This does not affect the integrity of the ISO 7816 interface connections.

The new eight pins comprising the Second Part are connected to the data bus of the memory circuits internal to the Smart Card. Thus, once data transfer has been initiated, the data can be transferred one byte (eight bits) at a time compared to the one bit at a time over the serial connection at pin 7 of the normal ISO 7816 interface. The data transfer in both cases is synchronous with the data clock, which is present at pin 3 of the normal ISO 7816 interface.

As the 'permitted' user-data is embedded within the serial data protocols of the ISO 7816 standard, the true user-data transfer rate is considerably slower than the possible serial clock rate. Once data transfer has been initiated, the new interface, the Third Part, will transfer data at eight times the serial clock rate. Thus user-data transfer is at a much greater rate than the normal ISO 7816 standard allows, and the integrity of the ISO 7816 standard is not compromised.

The existing ISO 7816 standard pin numberings and functions of the normal interface have been retained in the First Part. The additional pins of the Second Part are numbered 9 through to 16, and correspond to data bits 1 through to 8 of the data bus connections (i.e. an eight-bit wide data bus). The new pins of the Second Part are numbered in the same way as the pins 1 through to 8 of the First Part. Thus pin 9 of the Second Part is adjacent to pin 4 of the First Part, and pin 13 of the Second Part is adjacent to pin 8 of the First Part. (See Figure 2).

Diagrams

Figure 1 shows the position and proportions of the interface relative to the Smart Card. The ISO7816 standard interface, the First Part, is at 'A'. Adjacent to this, and maintaining the same contact separation as the contacts of the First Part, 'A', is the new parallel interface, the Second Part, at 'B'. This comprises a further eight contacts, the minimum contact pad proportions and dimensions of which conform to the detail dimensions of the contact pin connections of ISO7816, but are positioned adjacent to the existing interface, 'A'. The combined First Part and Second Part constitute the Third Part, 'C'.

Figure 2 shows the electrical connections of the dual interface, the Third Part. Pins 1 to 8 conform to the ISO7816 standard and have the same numbering and pin functions. Pins 9 to 16 correspond to the parallel data bits one to eight respectively. The existing 'ground' contact at pin 5 of the First Part is extended through the physical centre of the First Part - see figure 2, Pin 'a', to the physical centre of the Second Part - see figure 2, Pin 'b'. The contact pad areas 'a' and 'b' represent the minimum areas which must be available as 'ground ' connections to the centres of interfaces the First Part and the Second Part respectively. Thus pin 5 of the existing ISO7816 interface is electrically and mechanically connected to pins 'a' and 'b' of interfaces the First Part and the Second Part respectively.

The interface reader makes an external 'ground' connection at pin 5, as in a conventional Smart Card reader. Detection of a 'ground' at pin 'a' only indicates a conventional Smart Card has been inserted into the reader. Detection of a 'ground' at pins 'a' and 'b' indicates a 'Parallel Interface' Card has been inserted.

Figure 2 Table of Electrical Connections

The Electrical connections are: -

Pin 1 - Vcc - typically +5 Volts.

Pin 2 - RST - Reset.

Pin 3 - CLK - Data Clock.

Pin 4 - NC - Not Connected - Reserved for future use.

Pin 5 - GND - Ground - 0 Volts.

Pin 6 - Vpp - Programming Voltage.

Pin 7 - I /O - Input / Output.

Pin 8 - NC - Not Connected - Reserved for future use.

Pin 9 - Data Bit 1 - Parallel Data - Least Significant Bit - LSB.

Pin 10 - Data Bit 2 - Parallel Data.

Pin 11 - Data Bit 3 - Parallel Data.

Pin 12 - Data Bit 4 - Parallel Data.

Pin 13 - Data Bit 5 - Parallel Data.

Pin 14 - Data Bit 6 - Parallel Data.

Pin 15 - Data Bit 7 - Parallel Data.

Pin 16 - Data Bit 8 - Parallel Data - Most Significant Bit - MSB.

Pin 'a' - Ground - Electrically and Mechanically Connected to Pin 5.

Pin 'b' - Ground - Electrically and Mechanically Connected to Pin 5.

The card, conventionally is a flat planar rectangular surface, of nominal thickness 0.3mm to 1.00mm. In current usage the ISO standard requires the longitudinal axis to be inserted into a reader port. The electrical apparatus as described herein is not restricted to the convention and may be inserted into an appropriately engineered transverse axis port. The apparatus may have a plurality of contact pads on both sides of the flat planar rectangular surface, as described in Figure 2, but located as to register on the transverse interconnection.

It is obvious that the additional opportunities to position multiple data and storage Integrated Circuits in these positions gives significant advantages over a standard Smart Card.

Figure 3 shows various positions that multiple interfaces may be located on the card. It is possible to position an interface at either or both ends of the card and on one or both sides or faces of the card. It would be possible, with two opposing read heads, to read both sides of a card at the same time, or contiguously. The preferred positions are with one interface at each end of the card, on opposing sides. This requires only a single read head. Thus the card is inverted longitudinally to utilise the second interface.

Figures 4, 5, & 6 show different physical implementations of the contact areas of the Third Part.

Figure 4 depicts an interface constructed in rectangular form, about a central rectangular 'ground' plane.

Figure 5 depicts an interface constructed about octagonal centres of the 'ground' planes in the First Part and the Second Part, using connector pins having angled edges.

Figure 6 depicts an interface constructed about circular centres of the 'ground' planes in the First Part and the Second Part, using connectors having curved edges.

Claims

1. The Electrical Apparatus maintains the external dimensions of the Smart Card and utilises the contact pad protocols of the ISO 7816 standard to position the serial port interface whilst also including one or more adjacent interconnected contact pad areas with surfaces to enable the transmission of parallel information.

   This information may be controlled by the logic circuits and programme disciplines of the ISO 7816 interconnection whilst enabling the rate of data transfer to be significantly increased.

2. The electrical apparatus is not limited to the ISO7816 linked data transfer protocols and can be used for non-ISO fast serial, fast parallel and dual type interfaces.

   The port types and combinations with this new parallel combination port enable the following arrangements: -

   ISO standard serial type

   ISO controlled parallel type

   ISO controlled dual parallel & serial type

   non-ISO fast serial type

   non-ISO fast parallel type

   non-ISO fast dual parallel & serial type

3. An electronic apparatus according to claim1 characterised in that the integrated circuit storage means comprises only Read-Only-Memory (ROM).

4. An electronic apparatus according to claim 1 characterised in that the integrated circuit storage means comprises Flash Memory.

5. The area of the card surface adjacent to the serial pad can be used for a plurality of additional parallel port pads and their supporting integrated circuits thereby increasing the available storage capacity and /or the number of parallel data lines available.

6. Claims as per claim 1, wherein the device is not restricted to the external dimensions of the Smart Card. A polygonal or circular planar surface, or similar, may be used with indexable registers and associated interface connections.

7. A plurality of devices on both sides and/or ends of the Smart Card as characterised in claims 1,2,3,4,5 above.

8. A three dimensional cylindrical, tubular, conical or spherical device, which has items of the Third Part attached to form a mechanical presentation to a reader, and a plurality of devices as in claims 1 to 7.

9. Any novel feature or novel combination of features described herein and / or in the accompanying drawings.

PATENTS ACT 1977
JBM/BJ/001

Title: Electronic Apparatus

Abstract of Invention

The invention relates to an electronic apparatus and in particular to one adapted to function as a method of collecting, retaining and making available electronic data in such a fashion that it can be accessed efficiently from, for example; credit sized cards.

The invention is intended to enable the use of an interface for parallel data transfers between a Credit Card sized (86mm x 54mm) standard card and a host reader. This new standard will facilitate fast data transfer through the interface thereby providing a cost-effective solution for efficient storage and retrieval of data on a conveniently sized, portable medium.

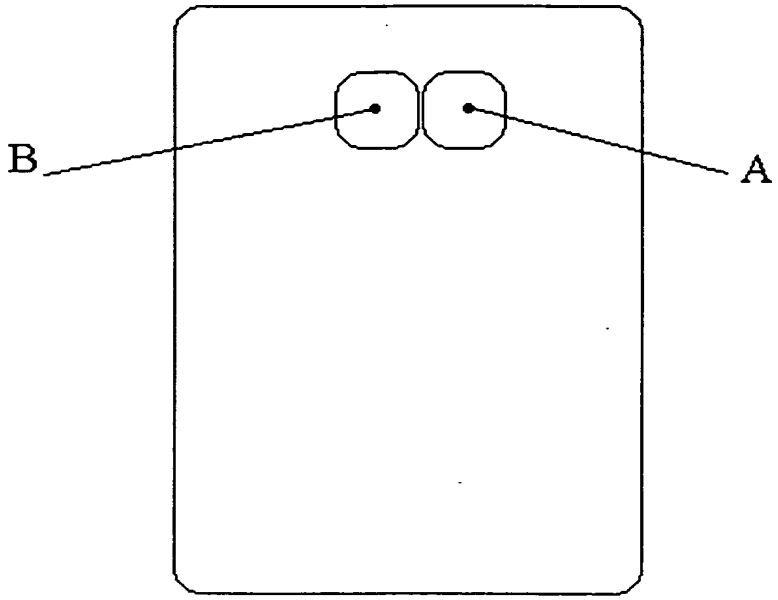

Figure 1a

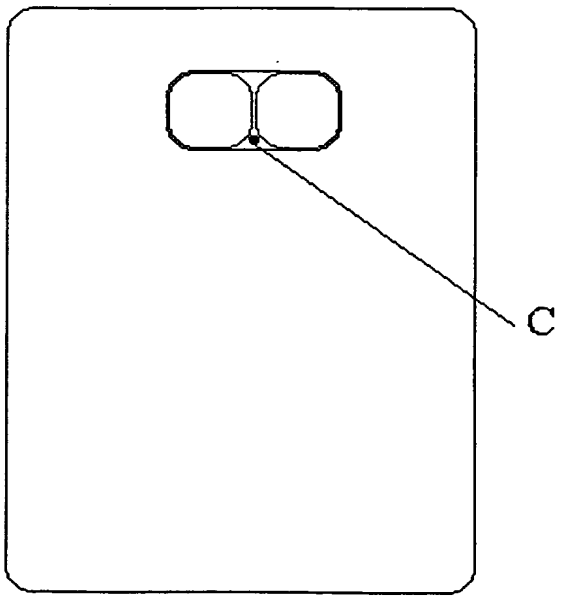

Figure 1b

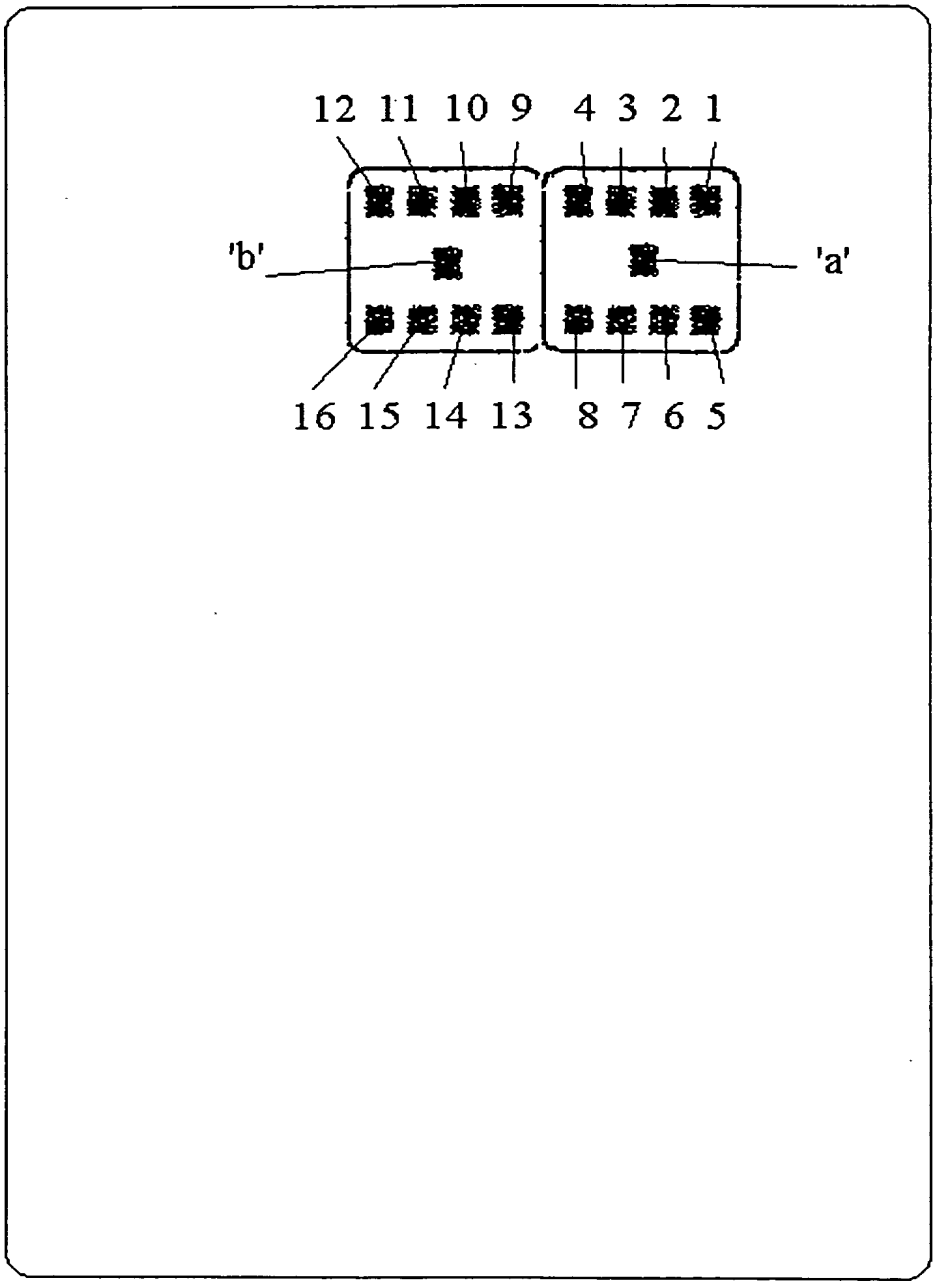

Figure 2

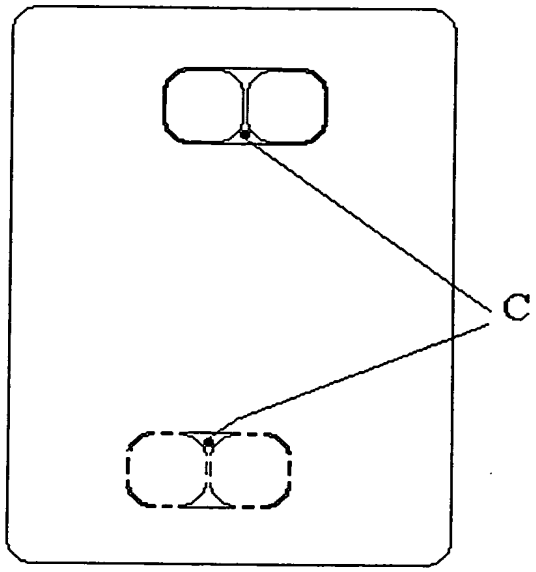

Figure 3a

Figure 3b

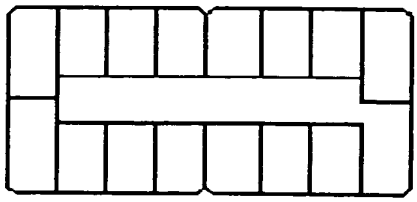

Figure 4

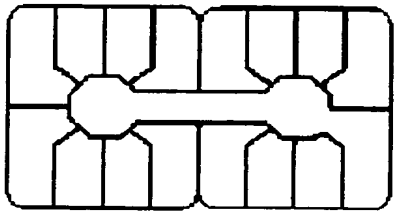

Figure 5

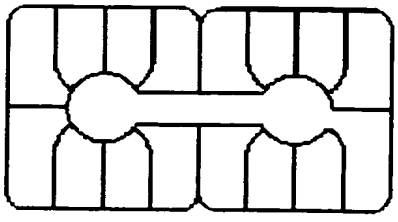

Figure 6

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